SHARP **ENGLISH**

SCIENTIFIC CALCULATOR

MODEL **EL-520W**

OPERATION MANUAL

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INTRODUCTION

Thank you for purchasing the SHARP Scientific Calculator Model EL-520W.
About the **calculation examples (including some formulas and tables)**, refer to the reverse side of this English manual. **Refer to the number on the right of each title in the manual for use**.
After reading this manual, store it in a convenient location for future reference.

Operational Notes

- Do not carry the calculator around in your back pocket, as it may break when you sit down. The display is made of glass and is particularly fragile.
- Keep the calculator away from extreme heat such as on a car dashboard or near a heater, and avoid exposing it to excessively humid or dusty environments.
- Since this product is not waterproof, do not use it or store it where fluids, for example water, can splash onto it. Raindrops, water spray, juice, coffee, steam, perspiration, etc. will also cause malfunction.
- Clean with a soft, dry cloth. Do not use solvents or a wet cloth.
- Do not drop it or apply excessive force.
- Never dispose of batteries in a fire.
- Keep batteries out of the reach of children.
- This product, including accessories, may change due to upgrading without prior notice.

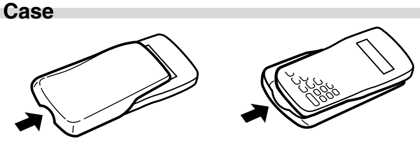
NOTICE

- SHARP strongly recommends that separate permanent written records be kept of all important data. Data may be lost or altered in virtually any electronic memory product under certain circumstances. Therefore, SHARP assumes no responsibility for data lost or otherwise rendered unusable whether as a result of improper use, repairs, defects, battery replacement, use after the specified battery life has expired, or any other cause.
- SHARP will not be liable nor responsible for any incidental or consequential economic or property damage caused by misuse and/or malfunctions of this product and its peripherals, unless such liability is acknowledged by law.

♦ Press the RESET switch (on the back), with the tip of a ball-point pen or similar object, only in the following cases. Do not use an object with a breakable or sharp tip. Note that pressing the RESET switch erases all data stored in memory.
- When using for the first time
- After replacing the batteries
- To clear all memory contents
- When an abnormal condition occurs and all keys are inoperative.

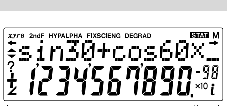
If service should be required on this calculator, use only a SHARP servicing dealer, SHARP approved service facility, or SHARP repair service where available.

Hard Case



DISPLAY

Equation→ Display



←Symbol

Mantissa Exponent

- During actual use, not all symbols are displayed at the same time.
- Certain inactive symbols may appear visible when viewed from a far off angle.
- Only the symbols required for the usage under instruction are shown in the display and calculation examples of this manual.

←/→ : Appears when the entire equation cannot be displayed. Press [◀]/[▶] to see the remaining (hidden) section.

xy/rθ : Indicates the mode of expression of results in the complex calculation mode.

▲/▼ : Indicates that data can be visible above/below the screen. Press [▲]/[▼] to scroll up/down the view.

2ndF : Appears when [2ndF] is pressed.

HYP : Indicates that [hyp] has been pressed and the hyperbolic functions are enabled. If [2ndF] [arc hyp] are pressed, the symbols "**2ndF HYP**" appear, indicating that inverse hyperbolic functions are enabled.

ALPHA : Appears when [ALPHA] (STAT VAR), [STO] or [RCL] is pressed.

FIX/SCI/ENG: Indicates the notation used to display a value.

DEG/RAD/GRAD: Indicates angular units.

STAT : Appears when statistics mode is selected.

M : Indicates that a value is stored in the independent memory.

? : Indicates that the calculator is waiting for a numerical value to be entered, such as during simulation calculation.

∠ : Appears when the calculator shows an angle as the result in the complex calculation mode.

i : Indicates an imaginary number is being displayed in the complex calculation mode.

BEFORE USING THE CALCULATOR

Key Notation Used in this Manual

In this manual, key operations are described as follows:

To specify e^x : [2ndF] [e^x]
To specify ln : [ln]
To specify F : [ALPHA] [F]

Functions that are printed in orange above the key require [2ndF] to be pressed first before the key. When you specify the memory, press [ALPHA] first. Numbers for input value are not shown as keys, but as ordinary numbers.

Power On and Off

Press [ON/C] to turn the calculator on, and [2ndF] [OFF] to turn it off.

Clearing the Entry and Memories

Operation	Entry (Display)	M F1-F4	A-F, X, Y ANS	STAT*1 STAT VAR*2
[ON/C]	○	×	×	×
[2ndF] [CA]	○	×	○	○
Mode selection	○	×	○	○
[2ndF] [M-CLR] [0] [0]*3	○	○	○	○
[2ndF] [M-CLR] [1] [0]*4	○	○	○	○
RESET switch	○	○	○	○

○ : Clear × : Retain
*1 Statistical data (entered data).
*2 $\bar{x}$, sx, σx, n, Σx, Σx^2, $\bar{y}$, sy, σy, Σy, Σy^2, Σxy, r, a, b, c.
*3 All variables are cleared.
*4 This key combination functions the same as the RESET switch.

[Memory clear key]

Press [2ndF] [M-CLR] to display the menu.

MEM RESET
0 1

- To clear all variables (M, A-F, X, Y, ANS, F1-F4, STAT VAR), press [0] [0] or [0] [ENT].
- To RESET the calculator, press [1] [0] or [1] [ENT]. The RESET operation will erase all data stored in memory, and restore the calculator's default setting.

Entering and Correcting the Equation

[Cursor keys]
- Press [◀] or [▶] to move the cursor. You can also return to the equation after getting an answer by pressing [▶] ([◀]). See the next section for using the [▲] and [▼] keys.
- See 'SET UP menu' for cursor use in the SET UP menu.

[Insert mode and Overwrite mode in the Equation display]
- Pressing [2ndF] [INS] switches between the two editing modes: insert mode (default); and overwrite mode. A triangular cursor indicates that an entry will be inserted at the cursor, while the rectangular cursor indicates to overwrite preexisting data as you make entries.
- To insert a number in the insert mode, move the cursor to the place immediately after where you wish to insert, then make a desired entry. In the overwrite mode, data under the cursor will be overwritten by the number you enter.
- The mode set will be retained until the next RESET operation.

[Deletion key]
- To delete a number/function, move the cursor to the number/function you wish to delete, then press [DEL]. If the cursor is located at the right end of an equation, the [DEL] key will function as a back space key.

Multi-line Playback Function 【1】

Previous equations may be recalled in the normal mode. Equations also include calculation ending instructions such as "=" and a maximum of 142 characters can be stored in memory. When the memory is full, stored equations are deleted in the order of the oldest first. Pressing [▲] will display the previous equation and the answer. Further pressing [▲] will display preceding equations (after returning to the previous equation, press [▼] to view equations in order). In addition, [2ndF] [▲] can be used to jump to the oldest equation.
- To edit an equation after recalling it, press [▶] ([◀]).
- The multi-line memory is cleared by the following operations: [2ndF] [CA], [2ndF] [OFF] (including the Automatic Power Off feature), mode change, memory clear ([2ndF] [M-CLR]), RESET, [2ndF] [RANDOM], [ALPHA] ([RCL]) [ANS], constant calculation, differential/integral calculation, chain calculation, angle unit conversion, coordinate conversion, N-base conversion, numerical value storage to the temporary memories and independent memory, solver function and simulation calculation.

Priority Levels in Calculation

Operations are performed according to the following priority:
① Fractions (1⌐4, etc.) ② ∠, engineering prefixes ③ Functions preceded by their argument (x^{-1}, x^2, n!, etc.) ④ Y^x, $^x\sqrt{\ }$ ⑤ Implied multiplication of a memory value (2Y, etc.) ⑥ Functions followed by their argument (sin, cos, etc.) ⑦ Implied multiplication of a function (2sin30, etc.) ⑧ $_nC_r$, $_nP_r$ ⑨ ×, ÷ ⑩ +, – ⑪ AND ⑫ OR, XOR, XNOR ⑬ =, M+, M–, ⇒M, ▶DEG, ▶RAD, ▶GRAD, DATA, CD, →rθ, →xy and other calculation ending instructions
- If parentheses are used, parenthesized calculations have precedence over any other calculations.

INITIAL SET UP

Mode Selection

[MODE] [0]: Normal mode (NORMAL)
[MODE] [1]: Statistic mode (STAT)
[MODE] [2]: Equation mode (EQN)
[MODE] [3]: Complex number mode (CPLX)

SET UP menu 【2】

Press [SET UP] to display the SET UP menu.

DRG FSE TAB
0 1

- A menu item can be selected by:
  - moving the flashing cursor by using [▶] [◀], then pressing [ENT] ([=] key), or
  - pressing the number key corresponding to the menu item number.
- If ▲ or ▼ is displayed on the screen, press [▲] or [▼] to view the previous/next menu screen.
- Press [ON/C] to exit the SET UP menu.

[Determination of the Angular Unit]
The following three angular units (degrees, radians, and grads) can be specified.
- DEG (°) : Press [SET UP] [0] [0].
- RAD (rad) : Press [SET UP] [0] [1].
- GRAD (g) : Press [SET UP] [0] [2].

[Selecting the Display Notation and Decimal Places]
Four display notation systems are used to display calculation results: Floating point; Fixed decimal point; Scientific notation; and Engineering notation.
- When the FIX, SCI, or ENG symbol is displayed, the number of decimal places (TAB) can be set to any value between 0 and 9. Displayed values will be reduced to the corresponding number of digits.

[Setting the Floating Point Numbers System in Scientific Notation]
Two settings are used to display a floating point number: NORM1 (default setting) and NORM2. A number is automatically displayed in scientific notation outside a preset range:
- NORM1: 0.000000001 ≤ x ≤ 9999999999
- NORM2: 0.01 ≤ x ≤ 9999999999

SCIENTIFIC CALCULATIONS

- Press [MODE] [0] to select the normal mode.
- In each example, press [ON/C] to clear the display. If the FIX, SCI, or ENG indicator is displayed, clear the indicator by selecting 'NORM1' from the SET UP menu.

Arithmetic Operations 【3】

- The closing parenthesis [)] just before [=] or [M+] may be omitted.

Constant Calculations 【4】

- In constant calculations, the addend becomes a constant. Subtraction and division are performed in the same manner. For multiplication, the multiplicand becomes a constant.
- In the constants calculations, constants will be displayed as K.

Functions 【5】

- Refer to the calculation examples of each function.
- Before starting calculations, specify the angular unit.

Differential/Integral Functions 【6】

Differential and integral calculations are only available in the normal mode. For calculation conditions such as the x value in differential calculation or the initial point in integral calculation, only numerical values can be entered and equations such as 2^2 cannot be specified. It is possible to reuse the same equation over and over again and to recalculate by only changing the conditions without re-entering the equation.
- Performing a calculation will clear the value in the X memory.
- When performing a differential calculation, enter the formula first and then enter the x value in differential calculation and the minute interval (dx). If a numerical value is not specified for minute interval, x≠0 will be $|x|\times10^{-5}$ and x=0 will be 10^{-5} from the value of the numeric derivative.
- When performing an integral calculation, enter the formula first and then enter a range of integral (a, b) and subintervals (n). If a numerical value is not specified for subintervals, calculation will be performed using n=100.

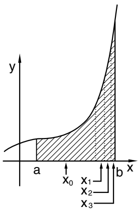
Since differential and integral calculations are performed based on the following equations, correct results may not be obtained, in certain rare cases, when performing special calculations that contain discontinuous points.

Integral calculation (Simpson's rule):

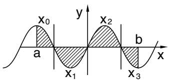
$$S=\frac{1}{3}h\{f(a)+4\{f(a+h)+f(a+3h)+\cdots\cdots+f(a+(N-1)h)\} +2\{f(a+2h)+f(a+4h)+\cdots\cdots+f(a+(N-2)h)\}+f(b)\}\quad \left(\begin{array}{l} h=\frac{b-a}{N} \\ N=2n \\ a\leq x\leq b \end{array}\right)$$

Differential calculation: $f'(x)=\dfrac{f(x+\frac{dx}{2})-f(x-\frac{dx}{2})}{dx}$

[When performing integral calculations]



Integral calculations, depending on the integrands and subintervals included, require longer calculation time. During calculation, "Calculating!" will be displayed. To cancel calculation, press [ON/C]. Note that there will be greater integral errors when there are large fluctuations in the integral values during minute shifting of the integral range and for periodic functions, etc., where positive and negative integral values exist depending on the interval.



For the former case, divide integral intervals as small as possible. For the latter case, separate the positive and negative values. Following these tips will allow results of calculations with greater accuracy and will also shorten the calculation time.

Random Function

The Random function has four settings for use in the normal or statistics mode. (This function cannot be selected while using the N-Base function.) To generate further random numbers in succession, press [ENT]. Press [ON/C] to exit.

- The generated pseudo-random number series is stored in memory Y. Each random number is based on a number series.

[Random Numbers]

A pseudo-random number, with three significant digits from 0 up to 0.999, can be generated by pressing [2ndF] [RANDOM] [0] [ENT].

[Random Dice]

To simulate a die-rolling, a random integer between 1 and 6 can be generated by pressing [2ndF] [RANDOM] [1] [ENT].

[Random Coin]

To simulate a coin flip, 0 (head) or 1 (tail) can be randomly generated by pressing [2ndF] [RANDOM] [2] [ENT].

[Random Integer]

An integer between 0 and 99 can be generated randomly by pressing [2ndF] [RANDOM] [3] [ENT].

Angular Unit Conversions 【7】

Each time [2ndF] [DRG▸] are pressed, the angular unit changes in sequence.

Memory Calculations 【8】

Mode	ANS	M, F1-F4	A-F, X, Y
NORMAL	○	○	○
STAT	○	×	×
EQN	×	×	×
CPLX	○	○	×

○ : Available × : Unavailable

[Temporary memories (A-F, X and Y)]

Press [STO] and a variable key to store a value in memory.
Press [RCL] and a variable key to recall a value from the memory.
To place a variable in an equation, press [ALPHA] and a variable key.

[Independent memory (M)]

In addition to all the features of temporary memories, a value can be added to or subtracted from an existing memory value.
Press [ON/C] [STO] [M] to clear the independent memory (M).

[Last answer memory (ANS)]

The calculation result obtained by pressing [=] or any other calculation ending instruction is automatically stored in the last answer memory.

[Formula memories (F1-F4)]

Formulas up to 256 characters in total can be stored in F1 - F4. (Functions such as sin, etc., will be counted as one letter.) Storing a new equation in each memory will automatically replace the existing equation.

Note:

- Calculation results from the functions indicated below are automatically stored in memories X or Y replacing existing values.
  - Random function ...... Y memory
  - $\rightarrow r\theta$, $\rightarrow xy$ .... X memory (r or x), Y memory (θ or y)
- Use of [RCL] or [ALPHA] will recall the value stored in memory using up to 14 digits.

Chain Calculations 【9】

- The previous calculation result can be used in the subsequent calculation. However, it cannot be recalled after entering multiple instructions.
- When using postfix functions ($\sqrt{\ }$, sin, etc.), a chain calculation is possible even if the previous calculation result is cleared by the use of the [ON/C] or [2ndF] [CA] keys.

Fraction Calculations 【10】

Arithmetic operations and memory calculations can be performed using fractions, and conversion between a decimal number and a fraction.

- If the number of digits to be displayed is greater than 10, the number is converted to and displayed as a decimal number.

Binary, Pental, Octal, Decimal, and Hexadecimal Operations (N-Base) 【11】

Conversions can be performed between N-base numbers. The four basic arithmetic operations, calculations with parentheses and memory calculations can also be performed, along with the logical operations AND, OR, NOT, NEG, XOR and XNOR on binary, pental, octal and hexadecimal numbers.
Conversion to each system is performed by the following keys:

[2ndF] [➔BIN] ("b" appears.), [2ndF] [➔PEN] ("P" appears.), [2ndF] [➔OCT] ("o" appears.), [2ndF] [➔HEX] ("H" appears.), [2ndF] [➔DEC] ("b", "P", "o" and "H" disappear.)

Note: The hexadecimal numbers A – F are entered by pressing [CNST], [y^x], [$\sqrt{x}$], [x^2], [x^3], [log], and [ln], and displayed as follows:

A → A, B → b, C → C, D → d, E → E, F → F

In the binary, pental, octal, and hexadecimal systems, fractional parts cannot be entered. When a decimal number having a fractional part is converted into a binary, pental, octal, or hexadecimal number, the fractional part will be truncated. Likewise, when the result of a binary, pental, octal, or hexadecimal calculation includes a fractional part, the fractional part will be truncated. In the binary, pental, octal, and hexadecimal systems, negative numbers are displayed as a complement.

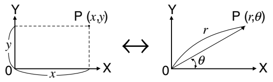
Time, Decimal and Sexagesimal Calculations 【12】

Conversion between decimal and sexagesimal numbers can be performed, and, while using sexagesimal numbers, conversion to seconds and minutes notation. The four basic arithmetic operations and memory calculations can be performed using the sexagesimal system. Notation for sexagesimal is as follows:

12°34'56.78"
degree — minute — second

Coordinate Conversions 【13】

- Before performing a calculation, select the angular unit.



Rectangular coord. Polar coord.

- The calculation result is automatically stored in memories X and Y.
  - Value of r or x: X memory
  - Value of θ or y: Y memory

Calculations Using Physical Constants 【14】

See the quick reference card and the English manual reverse side.
A constant is recalled by pressing [CNST] followed by the number of the physical constant designated by a 2-digit number.
The recalled constant appears in the display mode selected with the designated number of decimal places.
Physical constants can be recalled in the normal mode (when not set to binary, pental, octal, or hexadecimal), equation mode, or statistics mode.

Note: Physical constants and metric conversions are based either on the 2002 CODATA recommended values or 1995 Edition of the "Guide for the Use of the International System of Units (SI)" released by NIST (National Institute of Standards and Technology) or on ISO specifications.

No.	Constant	No.	Constant
01	Speed of light in vacuum	27	Stefan-Boltzmann constant
02	Newtonian constant of gravitation	28	Avogadro constant
03	Standard acceleration of gravity	29	Molar volume of ideal gas (273.15 K, 101.325 kPa)
04	Electron mass	30	Molar gas constant
05	Proton mass	31	Faraday constant
06	Neutron mass	32	Von Klitzing constant
07	Muon mass	33	Electron charge to mass quotient
08	Atomic mass unit-kilogram relationship	34	Quantum of circulation
		35	Proton gyromagnetic ratio
09	Elementary charge	36	Josephson constant
10	Planck constant	37	Electron volt
11	Boltzmann constant	38	Celsius Temperature
12	Magnetic constant	39	Astronomical unit
13	Electric constant	40	Parsec
14	Classical electron radius	41	Molar mass of carbon-12
15	Fine-structure constant	42	Planck constant over 2 pi
16	Bohr radius	43	Hartree energy
17	Rydberg constant	44	Conductance quantum
18	Magnetic flux quantum	45	Inverse fine-structure constant
19	Bohr magneton	46	Proton-electron mass ratio
20	Electron magnetic moment	47	Molar mass constant
21	Nuclear magneton	48	Neutron Compton wavelength
22	Proton magnetic moment	49	First radiation constant
23	Neutron magnetic moment	50	Second radiation constant
24	Muon magnetic moment	51	Characteristic impedance of vacuum
25	Compton wavelength		
26	Proton Compton wavelength	52	Standard atmosphere

Metric Conversions 【15】

See the quick reference card and the English manual reverse side.
Unit conversions can be performed in the normal mode (when not set to binary, pental, octal, or hexadecimal), equation mode and statistics modes.

No.	Remarks	No.	Remarks
1	in : inch	23	fl oz(US): fluid ounce(US)
2	cm : centimeter	24	mℓ : milliliter
3	ft : foot	25	fl oz(UK): fluid ounce(UK)
4	m : meter	26	mℓ : milliliter
5	yd : yard	27	J : Joule
6	m : meter	28	cal : calorie
7	mile : mile	29	J : Joule
8	km : kilometer	30	cal_{15} : Calorie (15n°C)
9	n mile : nautical mile	31	J : Joule
10	m : meter	32	cal_{IT} : I.T. calorie
11	acre : acre	33	hp : horsepower
12	m^2 : square meter	34	W : watt
13	oz : ounce	35	ps : French horsepower
14	g : gram	36	W : watt
15	lb : pound	37	
16	kg : kilogram	38	Pa : Pascal
17	°F : Degree Fahrenheit	39	atm : atmosphere
18	°C : Degree Celsius	40	Pa : Pascal
19	gal (US) : gallon (US)	41	(1 mmHg = 1 Torr)
20	ℓ : liter	42	Pa : Pascal
21	gal (UK) : gallon (UK)	43	
22	ℓ : liter	44	J : Joule

Calculations Using Engineering Prefixes 【16】

Calculation can be executed in the normal mode (excluding N-base) using the following 9 types of prefixes.

Prefix	Operation	Unit
k (kilo)	[MATH] [1] [0]	10^3
M (Mega)	[MATH] [1] [1]	10^6
G (Giga)	[MATH] [1] [2]	10^9
T (Tera)	[MATH] [1] [3]	10^{12}
m (milli)	[MATH] [1] [4]	10^{-3}
μ (micro)	[MATH] [1] [5]	10^{-6}
n (nano)	[MATH] [1] [6]	10^{-9}
p (pico)	[MATH] [1] [7]	10^{-12}
f (femto)	[MATH] [1] [8]	10^{-15}

Modify Function 【17】

Calculation results are internally obtained in scientific notation with up to 14 digits for the mantissa. However, since calculation results are displayed in the form designated by the display notation and the number of decimal places indicated, the internal calculation result may differ from that shown in the display. By using the modify function, the internal value is converted to match that of the display, so that the displayed value can be used without change in subsequent operations.

Solver Function 【18】

The x value can be found that reduces an entered equation to "0".

- This function uses Newton's method to obtain an approximation. Depending on the function (e.g. periodic) or 'Start' value, an error may occur (Error 2) due to there being no convergence to the solution for the equation.
- The value obtained by this function may include a margin of error. If it is larger than acceptable, recalculate the solution after changing 'Start' and dx values.
- Change the 'Start' value (e.g. to a negative value) or dx value (e.g. to a smaller value) if:
  - no solution can be found (Error 2).
  - more than two solutions appear to be possible (e.g. a cubic equation).
  - to improve the arithmetic precision.
- The calculation result is automatically stored in the X memory.

[Performing Solver function]

① Press [MODE] [0].
② Input a formula with an x variable.
③ Press [MATH] [0].
④ Input 'Start' value and press [ENT]. The default value is "0".
⑤ Input dx value (minute interval).
⑥ Press [ENT].

SIMULATION CALCULATION (ALGB) 【19】

If you have to find a value consecutively using the same formula, such as plotting a curve line for $2x^2 + 1$, or finding the variable for $2x + 2y = 14$, once you enter the equation, all you have to do is to specify the value for the variable in the formula.
Usable variables: A-F, M, X and Y
Unusable functions: Random function

- Simulation calculations can only be executed in the normal mode.
- Calculation ending instructions other than [=] cannot be used.

Performing Calculations

① Press [MODE] [0].
② Input a formula with at least one variable.
③ Press [2ndF] [ALGB].
④ Variable input screen will appear. Input the value of the flashing variable, then press [ENT] to confirm. The calculation result will be displayed after entering the value for all used variables.
  - Only numerical values are allowed as variables. Input of formulas is not permitted.
  - Upon completing the calculation, press [2ndF] [ALGB] to perform calculations using the same formula.
  - Variables and numerical values stored in the memories will be displayed in the variable input screen. To change a numerical value, input the new value and press [ENT].
  - Performing simulation calculation will cause memory locations to be overwritten with new values.

STATISTICAL CALCULATIONS 【20】

Press [MODE] [1] to select the statistics mode. The seven statistical calculations listed below can be performed. After selecting the statistics mode, select the desired sub-mode by pressing the number key corresponding to your choice.
To change statistical sub-mode, reselect statistics mode (press [MODE] [1]), then select the required sub-mode.

[0] (SD) : Single-variable statistics
[1] (LINE) : Linear regression calculation
[2] (QUAD) : Quadratic regression calculation
[3] (EXP) : Exponential regression calculation
[4] (LOG) : Logarithmic regression calculation
[5] (PWR) : Power regression calculation
[6] (INV) : Inverse regression calculation

The following statistics can be obtained for each statistical calculation (refer to the table below):

Single-variable statistical calculation

Statistics of ① and value of the normal probability function

Linear regression calculation

Statistics of ① and ② and, in addition, estimate of y for a given x (estimate y') and estimate of x for a given y (estimate x')

Exponential regression, Logarithmic regression, Power regression, and Inverse regression calculation

Statistics of ① and ②. In addition, estimate of y for a given x and estimate of x for a given y. (Since the calculator converts each formula into a linear regression formula before actual calculation takes place, it obtains all statistics, except coefficients a and b, from converted data rather than entered data.)

Quadratic regression calculation

Statistics of ① and ② and coefficients a, b, c in the quadratic regression formula ($y = a + bx + cx^2$). (For quadratic regression calculations, no correlation coefficient (r) can be obtained.) When there are two x' values, press [2ndF] [←→].

When performing calculations using a, b and c, only one numeric value can be held.

①	$\bar{x}$	Mean of samples (x data)
	sx	Sample standard deviation (x data)
	σx	Population standard deviation (x data)
	n	Number of samples
	Σx	Sum of samples (x data)
	Σx^2	Sum of squares of samples (x data)
②	$\bar{y}$	Means of samples (y data)
	sy	Sample standard deviation (y data)
	σy	Population standard deviation (y data)
	Σy	Sum of samples (y data)
	Σy^2	Sum of squares of samples (y data)
	Σxy	Sum of products of samples (x, y)
	r	Correlation coefficient
	a	Coefficient of regression equation
	b	Coefficient of regression equation
	c	Coefficient of quadratic regression equation

- Use [ALPHA] and [RCL] to perform a STAT variable calculation.

Data Entry and Correction 【21】

Entered data are kept in memory until [2ndF] [CA] or mode selection. Before entering new data, clear the memory contents.

[Data Entry]

Single-variable data
Data [DATA]
Data [(x,y)] *frequency* [DATA] (To enter multiples of the same data)

Two-variable data
Data x [(x,y)] *Data y* [DATA]
Data x [(x,y)] *Data y* [(x,y)] *frequency* [DATA] (To enter multiples of the same data x and y.)

- Up to 100 data items can be entered. With the single-variable data, a data item without frequency assignment is counted as one data item, while an item assigned with frequency is stored as a set of two data items. With the two-variable data, a set of data items without frequency assignment is counted as two data items, while a set of items assigned with frequency is stored as a set of three data items.

[Data Correction]

Correction prior to pressing [DATA] immediately after a data entry:
Delete incorrect data with [ON/C], then enter the correct data.

Correction after pressing [DATA]:
Use [▲] [▼] to display the data previously entered.
Press [▼] to display data items in ascending (oldest first) order. To reverse the display order to descending (latest first), press the [▲] key.
Each item is displayed with 'Xn=', 'Yn=', or 'Nn=' (n is the sequential number of the data set).
Display the data item to modify, input the correct value, then press [DATA]. Using [(x,y)], you can correct the values of the data set all at once.

- To delete a data set, display an item of the data set to delete, then press [2ndF] [CD]. The data set will be deleted.
- To add a new data set, press [ON/C] and input the values, then press [DATA].

Statistical Calculation Formulas 【22】

Type	Regression formula
Linear	$y = a + bx$
Exponential	$y = a \bullet e^{bx}$
Logarithmic	$y = a + b \bullet \ln x$
Power	$y = a \bullet x^b$
Inverse	$y = a + b \dfrac{1}{x}$
Quadratic	$y = a + bx + cx^2$

In the statistical calculation formulas, an error will occur when:

- The absolute value of the intermediate result or calculation result is equal to or greater than 1×10^{100}.
- The denominator is zero.
- An attempt is made to take the square root of a negative number.
- No solution exists in the quadratic regression calculation.

Normal Probability Calculations 【20】【23】

- P(t), Q(t), and R(t) will always take positive values, even when t<0, because these functions follow the same principle used when solving for an area.
  Values for P(t), Q(t), and R(t) are given to six decimal places.

SIMULTANEOUS LINEAR EQUATIONS 【24】【25】

Simultaneous linear equation with two unknowns (2-VLE) or with three unknowns (3-VLE) may be solved using this function.
① 2-VLE: [MODE] [2] [0]
② 3-VLE: [MODE] [2] [1]

- If the determinant D = 0, an error occurs.
- If the absolute value of an intermediate result or calculation result is 1×10^{100} or more, an error occurs.
- Coefficients (a_1, etc.) can be entered using ordinary arithmetic operations.
- To clear the entered coefficients, press [2ndF] [CA].
- Pressing [ENT] when the determinant D is in the display recalls the coefficients. Each time [ENT] is pressed, a coefficient is displayed in the order of input, allowing the entered coefficients to be verified (by pressing [2ndF] [ENT], coefficients are displayed in reverse order.) To correct a particular coefficient being displayed, enter the correct value and then press [ENT].

QUADRATIC AND CUBIC EQUATION SOLVERS 【26】

Quadratic ($ax^2 + bx + c = 0$) or cubic ($ax^3 + bx^2 + cx + d = 0$) equation may be solved using this function.
① Quadratic equation solver: [MODE] [2] [2]
② Cubic equation solver: [MODE] [2] [3]

- Press [ENT] after entering each coefficient.
- The result will be displayed by pressing [ENT] after entering all coefficients. When there are more than 2 results, the next solution will be displayed.
- When the result is an imaginary number, "xy" symbol will appear. The display can be switched between imaginary and real parts by pressing [2ndF] [←→].

COMPLEX NUMBER CALCULATIONS 【27】

To carry out addition, subtraction, multiplication, and division using complex numbers, press [MODE] [3] to select the complex number mode.
Results of complex number calculations are expressed in two modes:
① [2ndF] [→xy]: Rectangular coordinate mode (xy appears.)
② [2ndF] [→rθ]: Polar coordinate mode ($r\theta$ appears.)

Complex number entry

① Rectangular coordinates
x-coordinate [+] *y-coordinate* [i]
or *x-coordinate* [+] [i] *y-coordinate*
② Polar coordinates
r [∠] θ
r: absolute value θ: argument

- On selecting another mode, the imaginary part of any complex number stored in the independent memory (M) will be cleared.
- A complex number expressed in rectangular coordinates with the y-value equal to zero, or expressed in polar coordinates with the angle equal to zero, is treated as a real number.
- Press [MATH] [0] to return the complex conjugate of the specified complex number.

ERROR AND CALCULATION RANGES

Errors

An error will occur if an operation exceeds the calculation ranges, or if a mathematically illegal operation is attempted. When an error occurs, pressing [◀] (or [▶]) automatically moves the cursor back to the place in the equation where the error occurred. Edit the equation or press [ON/C] to clear the equation.

Error Codes and Error Types

Syntax error (Error 1):
- An attempt was made to perform an invalid operation.
  Ex. 2 [2ndF] [→rθ]

Calculation error (Error 2):
- The absolute value of an intermediate or final calculation result equals or exceeds 10^{100}.
- An attempt was made to divide by 0 (or an intermediate calculation resulted in zero).
- The calculation ranges were exceeded while performing calculations.

Depth error (Error 3):
- The available number of buffers was exceeded. (There are 10 buffers* for numeric values and 24 buffers for calculation instructions).
  *5 buffers in STAT mode and complex number mode.
- Data items exceeded 100 in the statistics mode.

Equation too long (Error 4):
- The equation exceeded its maximum input buffer (142 characters). An equation must be shorter than 142 characters.

Equation recall error (Error 5):
- The stored equation contains a function not available in the mode used to recall the equation. For example, if a numerical value with numbers other than 0 and 1 is stored as a decimal, etc., it cannot be recalled when the calculator is set to binary.

Memory over error (Error 6):
- Equation exceeded the formula memory buffer (256 characters in total in F1 - F4).

Calculation Ranges 【28】

- **Within the ranges specified, this calculator is accurate to ±1 of the least significant digit of the mantissa. However, a calculation error increases in continuous calculations due to accumulation of each calculation error. (This is the same for y^x, $\sqrt[x]{\ }$, e^x, *ln*, etc., where continuous calculations are performed internally.)**
  Additionally, a calculation error will accumulate and become larger in the vicinity of inflection points and singular points of functions.
- Calculation ranges
  $\pm 10^{-99} \sim \pm 9.999999999 \times 10^{99}$ and 0.

If the absolute value of an entry or a final or intermediate result of a calculation is less than 10^{-99}, the value is considered to be 0 in calculations and in the display.

BATTERY REPLACEMENT

Notes on Battery Replacement

Improper handling of batteries can cause electrolyte leakage or explosion. Be sure to observe the following handling rules:
- Replace both batteries at the same time.
- Do not mix new and old batteries.
- Make sure the new batteries are the correct type.
- When installing, orient each battery properly as indicated in the calculator.
- Batteries are factory-installed before shipment, and may be exhausted before they reach the service life stated in the specifications.

Notes on erasure of memory contents
When the battery is replaced, the memory contents are erased. Erasure can also occur if the calculator is defective or when it is repaired. Make a note of all important memory contents in case accidental erasure occurs.

When to Replace the Batteries

If the display has poor contrast or nothing appears on the display even when [ON/C] is pressed in dim lighting, it is time to replace the batteries.

Cautions

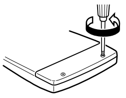
- Fluid from a leaking battery accidentally entering an eye could result in serious injury. Should this occur, wash with clean water and immediately consult a doctor.
- Should fluid from a leaking battery come in contact with your skin or clothes, immediately wash with clean water.
- If the product is not to be used for some time, to avoid damage to the unit from leaking batteries, remove them and store in a safe place.
- Do not leave exhausted batteries inside the product.
- Do not fit partially used batteries, and be sure not to mix batteries of different types.
- Keep batteries out of the reach of children.
- Exhausted batteries left in the calculator may leak and damage the calculator.
- Explosion risk may be caused by incorrect handling.
- Do not throw batteries into a fire as they may explode.

Replacement Procedure

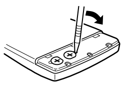
1. Turn the power off by pressing [2ndF] [OFF].
2. Remove the two screws. (Fig. 1)
3. Slide the battery cover slightly and lift it to remove.
4. Remove the used batteries by prying them out with a ball-point pen or other similar pointed device. (Fig. 2)
5. Install two new batteries. Make sure the "+" side is facing up.
6. Replace the cover and screws.
7. Press the RESET switch (on the back).

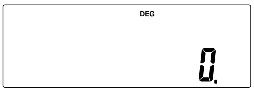
- Make sure that the display appears as shown below. If the display does not appear as shown, remove the batteries, reinstall them and check the display once again.

(Fig. 1)



(Fig. 2)





Automatic Power Off Function

This calculator will turn itself off to save battery power if no key is pressed for approximately 10 minutes.

SPECIFICATIONS

Calculations:	Scientific calculations, complex number calculations, equation solvers, statistical calculations, etc.
Internal calculations:	Mantissas of up to 14 digits
Pending operations:	24 calculations 10 numeric values (5 numeric values in STAT and complex number mode)
Power source:	Built-in solar cells 3 V ⎓ (DC): Backup batteries (Alkaline batteries (LR44) × 2)
Operating temperature:	0°C – 40°C (32°F – 104°F)
External dimensions:	79.6 mm (W) × 154.5 mm (D) × 13.2 mm (H) 3-1/8" (W) × 6-3/32" (D) × 17/32" (H)
Weight:	Approx. 97 g (0.22 lb) (Including batteries)
Accessories:	Batteries × 2 (installed), operation manual, quick reference card and hard case

FOR MORE INFORMATION ABOUT SCIENTIFIC CALCULATOR

Visit our Web site.
http://sharp-world.com/calculator/

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EL-520W

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EXEMPLOS DE CÁLCULO
ESEMPI DI CALCOLO
REKENVOORBEELDEN
PÉLDASZÁMÍTÁSOK
PŘÍKLADY VÝPOČTŮ
RÄKNEEXEMPEL
LASKENTAESIMERKKEJÄ
ПРИМЕРЫ ВЫЧИСЛЕНИЙ
UDREGNINGSEKSEMPLER
ตัวอย่างการคำนวณ
نماذج للحسابات
计算例子
CONTOH-CONTOH PENGHITUNGAN
CONTOH-CONTOH PERHITUNGAN

[1] [▲] [▼]

①3(5+2)=	[ON/C] 3 [(] 5 [+] 2 [)] [=]	21.
②3×5+2=	3 [×] 5 [+] 2 [=]	17.
③3×5+3×2=	3 [×] 5 [+] 3 [×] 2 [=]	21.
→①	[2ndF] [▲]	21.
→②	[▼]	17.
→③	[▼]	21.
→②	[▲]	17.

[2] [SET UP]

100000÷3=		
[NORM1]	[ON/C] 100000 [÷] 3 [=]	33'333.33333
→[FIX]	[SET UP] [1] [0]	33'333.33333
[TAB 2]	[SET UP] [2] 2	33'333.33
→[SCI]	[SET UP] [1] [1]	3.33 $\times 10^{04}$
→[ENG]	[SET UP] [1] [2]	33.33 $\times 10^{03}$
→[NORM1]	[SET UP] [1] [3]	33'333.33333
3÷1000=		
[NORM1]	[ON/C] 3 [÷] 1000 [=]	0.003
→[NORM2]	[SET UP] [1] [4]	3. $\times 10^{-03}$
→[NORM1]	[SET UP] [1] [3]	0.003

[3] [+] [−] [×] [÷] [(] [)] [+/−] [Exp]

45+285÷3=	[ON/C] 45 [+] 285 [÷] 3 [=]	140.
$\frac{18+6}{15-8}$=	[(] 18 [+] 6 [)] [÷] [(] 15 [−] 8 [=]	3.428571429
42×(−5)+120=	42 [×] [+/−] 5 [+] 120 [=] *1 (5 [+/−]) *1	−90.
(5×10³)÷(4×10⁻³)=	5 [Exp] 3 [÷] 4 [Exp] [+/−] 3 [=]	1'250'000.

[4]

34+57=	34 [+] 57 [=]	91.
45+57=	45 [=]	102.
68×25=	68 [×] 25 [=]	1'700.
68×40=	40 [=]	2'720.

[5] [sin] [cos] [tan] [sin⁻¹] [cos⁻¹] [tan⁻¹] [π] [hyp] [arc hyp] [ln] [log] [e^x] [10^x] [x^{-1}] [x^2] [x^3] [√] [y^x] [$\sqrt[x]{}$] [∛] [n!] [nPr] [nCr] [%]

sin60[°]=	[ON/C] [sin] 60 [=]	0.866025403
cos $\frac{\pi}{4}$ [rad]=	[SET UP] [0] [1] [cos] [(] [2ndF] [π] [÷] 4 [)] [=]	0.707106781
tan⁻¹1=[g]	[SET UP] [0] [2] [2ndF] [tan⁻¹] 1 [=]	50.
	[SET UP] [0] [0]	
(cosh 1.5 + sinh 1.5)² =	[ON/C] [(] [hyp] [cos] 1.5 [+] [hyp] [sin] 1.5 [)] [x^2] [=]	20.08553692
$\tanh^{-1}\frac{5}{7}$ =	[2ndF] [arc hyp] [tan] [(] 5 [÷] 7 [)] [=]	0.895879734
ln 20 =	[ln] 20 [=]	2.995732274
log 50 =	[log] 50 [=]	1.698970004
e^3 =	[2ndF] [e^x] 3 [=]	20.08553692
$10^{1.7}$ =	[2ndF] [10^x] 1.7 [=]	50.11872336
$\frac{1}{6}+\frac{1}{7}$ =	6 [2ndF] [x^{-1}] [+] 7 [2ndF] [x^{-1}] [=]	0.309523809
$8^{-2} - 3^4 \times 5^2$ =	8 [y^x] [+/−] 2 [−] 3 [y^x] 4 [×] 5 [x^2] [=]	−2'024.984375
$(12^3)^{\frac{1}{4}}$=	12 [y^x] 3 [y^x] 4 [2ndF] [x^{-1}] [=]	6.447419591
8^3	8 [x^3] [=]	512.
$\sqrt{49} - \sqrt[4]{81}$ =	[2ndF] [√] 49 [−] 4 [2ndF] [$\sqrt[x]{}$] 81 [=]	4.
$\sqrt[3]{27}$	[2ndF] [∛] 27 [=]	3.
4! =	4 [2ndF] [n!] [=]	24.
$_{10}P_3$ =	10 [2ndF] [nPr] 3 [=]	720.
$_5C_2$ =	5 [2ndF] [nCr] 2 [=]	10.
500×25%=	500 [×] 25 [2ndF] [%]	125.
120÷400=?%	120 [÷] 400 [2ndF] [%]	30.
500+(500×25%)=	500 [+] 25 [2ndF] [%]	625.
400−(400×30%)=	400 [−] 30 [2ndF] [%]	280.

- The range of the results of inverse trigonometric functions
- Der Ergebnisbereich für inverse trigonemetrische Funktionen
- Plage des résultats des fonctions trigonométriques inverses
- El rango de los resultados de funciones trigonométricas inversas
- Gama dos resultados das trigonométricas inversas
- La gamma dei risultati di funzioni trigonometriche inverse
- Het bereik van de resultaten van inverse trigonometrie
- Az inverz trigonometriai funkciók eredmény-tartománya
- Rozsah výsledků inverzních trigonometrických funkcí
- Omfång för resultaten av omvända trigonometriska funktioner
- Käänteisten trigonometristen funktioiden tulosten alue
- Диапазон результатов обратных тригонометрических функций
- Område for resultater af omvendte trigonometriske funktioner
- พิสัยของผลลัพท์ของ ฟังก์ชั่นตรีโกนมิตริผกผัน
- نطاق نتائج الدوال المثلثية المعكوسة
- 反三角函数计算结果的范围
- Julat hasil fungsi trigonometri songsang
- Kisaran hasil fungsi trigonometri inversi

	$\theta = \sin^{-1} x$, $\theta = \tan^{-1} x$	$\theta = \cos^{-1} x$
DEG	$-90 \le \theta \le 90$	$0 \le \theta \le 180$
RAD	$-\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$	$0 \le \theta \le \pi$
GRAD	$-100 \le \theta \le 100$	$0 \le \theta \le 200$

[6] [d/dx] [∫dx]

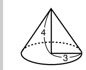
d/dx ($x^4 - 0.5x^3 + 6x^2$)	[ON/C] [ALPHA] [x] [y^x] 4 [−] 0.5 [ALPHA] [x] [x^3] [+] 6 [ALPHA] [x] [x^2]	
x=2, dx=0.00002	[2ndF] [d/dx] 2 [ENT] [ENT]	50.
x=3, dx=0.001	[ENT] 3 [ENT] 0.001 [ENT]	130.5000029
$\int_2^8 (x^2-5)dx$	[ON/C] [ALPHA] [x] [x^2] [−] 5	
n=100	[∫dx] 2 [ENT] 8 [ENT] [ENT]	138.
n=10	[ENT] [ENT] [ENT] 10 [ENT]	138.

[7] [DRG▸]

90°→ [rad]	[ON/C] 90 [2ndF] [DRG▸]	1.570796327
→ [g]	[2ndF] [DRG▸]	100.
→ [°]	[2ndF] [DRG▸]	90.
sin⁻¹0.8 = [°]	[2ndF] [sin⁻¹] 0.8 [=]	53.13010235
→ [rad]	[2ndF] [DRG▸]	0.927295218
→ [g]	[2ndF] [DRG▸]	59.03344706
→ [°]	[2ndF] [DRG▸]	53.13010235

[8] [ALPHA] [RCL] [STO] [M+] [M−] [ANS] [F1] [F2] [F3] [F4]

	[ON/C] 8 [×] 2 [STO] [M]	16.
24÷(8×2)=	24 [÷] [ALPHA] [M] [=]	1.5
(8×2)×5=	[ALPHA] [M] [×] 5 [=]	80.
	[ON/C] [STO] [M]	0.
$150×3:$M_1$	150 [×] 3 [M+]	450.
+)$250:$M_2$ =M_1+250	250 [M+]	250.
−)M_2×5%	[RCL] [M] [×] 5 [2ndF] [%]	35.
M	[2ndF] [M−] [RCL] [M]	665.
$1=¥110	110 [STO] [Y]	110.
¥26,510=$?	26510 [÷] [RCL] [Y] [=]	241.
$2,750=¥?	2750 [×] [RCL] [Y] [=]	302'500.
r=3cm (r→Y)	3 [STO] [Y]	3.
πr^2=?	[2ndF] [π] [ALPHA] [Y] [x^2] [=]	28.27433388
$\frac{24}{4+6}$ = 2.4...(A)	24 [÷] [(] 4 [+] 6 [)] [=]	2.4
3×(A)+60÷(A)=	3 [×] [ALPHA] [ANS] [+] 60 [÷] [ALPHA] [ANS] [=]	32.2
πr^2⇒F1	[2ndF] [π] [ALPHA] [Y] [x^2]	
	[STO] [F1]	F1
	3 [STO] [Y]	3.
V = ?	[RCL] [F1] [×] 4 [÷] 3 [=]	37.69911184



[9]

6+4=ANS	[ON/C] 6 [+] 4 [=]	10.
ANS+5	[+] 5 [=]	15.
8×2=ANS	8 [×] 2 [=]	16.
ANS²	[x^2] [=]	256.
44+37=ANS	44 [+] 37 [=]	81.
√ANS=	[2ndF] [√] [=]	9.

[10] [a b/c] [d/c]

$3\frac{1}{2} + \frac{4}{3} = [a\frac{b}{c}]$	[ON/C] 3 [a b/c] 1 [a b/c] 2 [+]	
	4 [a b/c] 3 [=]	4┌5┌6 *
→[a.xxx]	[a b/c]	4.833333333
→[d/c]	[2ndF] [d/c]	29┌6
$10^{\frac{2}{3}}$=	[2ndF] [10^x] 2 [a b/c] 3 [=]	4.641588834
$\left(\frac{7}{5}\right)^5$=	7 [a b/c] 5 [y^x] 5 [=]	16807┌3125
$\left(\frac{1}{8}\right)^{\frac{1}{3}}$=	1 [a b/c] 8 [y^x] 1 [a b/c] 3 [=]	1┌2
$\sqrt{\frac{64}{225}}$ =	[2ndF] [√] 64 [a b/c] 225 [=]	8┌15
$\frac{2^3}{3^4}$ =	[(] 2 [y^x] 3 [)] [a b/c] [(] 3 [y^x] 4 [)] [=]	8┌81
$\frac{1.2}{2.3}$ =	1.2 [a b/c] 2.3 [=]	12┌23
$\frac{1°2'3"}{2}$ =	1 [D°M'S] 2 [D°M'S] 3 [a b/c] 2 [=]	0°31'1.5"
$\frac{1\times10^3}{2\times10^3}$ =	1 [Exp] 3 [a b/c] 2 [Exp] 3 [=]	1┌2
A = 7	[ON/C] 7 [STO] [A]	7.
$\frac{4}{A}$ =	4 [a b/c] [ALPHA] [A] [=]	4┌7
$1.25 + \frac{2}{5}$ = [a.xxx]	1.25 [+] 2 [a b/c] 5 [=]	1.65
→$[a\frac{b}{c}]$	[a b/c]	1┌13┌20

* 4┌5┌6 = $4\frac{5}{6}$

[11] [▸BIN] [▸PEN] [▸OCT] [▸HEX] [▸DEC] [NEG] [NOT] [AND] [OR] [XOR] [XNOR]

DEC(25)→BIN	[ON/C] [2ndF] [▸DEC] 25 [2ndF] [▸BIN]	11001 b
HEX(1AC)	[2ndF] [▸HEX] 1AC	
→BIN	[2ndF] [▸BIN]	110101100 b
→PEN	[2ndF] [▸PEN]	3203 P
→OCT	[2ndF] [▸OCT]	654 o
→DEC	[2ndF] [▸DEC]	428.
BIN(1010−100)	[2ndF] [▸BIN] [(] 1010 [−] 100 [)]	
×11 =	[×] 11 [=]	10010 b
BIN(111)→NEG	[NEG] 111 [=]	1111111001 b
HEX(1FF)+	[2ndF] [▸HEX] 1FF [2ndF] [▸OCT] [+]	
OCT(512)=	512 [=]	1511 o
HEX(?)	[2ndF] [▸HEX]	349 H

2FEC–	[ON/C] [STO] [M] [2ndF] [→HEX] 2FEC [−]	
2C9E=(A)	2C9E [M+]	34E H
+)2000–	2000 [−]	
1901=(B)	1901 [M+]	6FF H
(C)	[RCL] [M]	A4d H
1011 AND	[ON/C] [2ndF] [→BIN] 1011 [AND]	
101 = (BIN)	101 [=]	1 b
5A OR C3 = (HEX)	[2ndF] [→HEX] 5A [OR] C3 [=]	db H
NOT 10110 = (BIN)	[2ndF] [→BIN] [NOT] 10110 [=]	1111101001 b
24 XOR 4 = (OCT)	[2ndF] [→OCT] 24 [XOR] 4 [=]	20 o
B3 XNOR	[2ndF] [→HEX] B3 [XNOR]	
2D = (HEX)	2D [=]	FFFFFFFF61 H
→DEC	[2ndF] [→DEC]	–159.

【12】 [D°M'S] [↔DEG] [MATH] (→sec, →min)

12°39'18.05"	[ON/C] 12 [D°M'S] 39 [D°M'S] 18.05	
→[10]	[2ndF] [↔DEG]	12.65501389
123.678→[60]	123.678 [2ndF] [↔DEG]	123°40'40.8"
3h30m45s +	3 [D°M'S] 30 [D°M'S] 45 [+] 6 [D°M'S]	
6h45m36s = [60]	45 [D°M'S] 36 [=]	10°16'21."
1234°56'12" +	1234 [D°M'S] 56 [D°M'S] 12 [+]	
0°0'34.567" = [60]	0 [D°M'S] 0 [D°M'S] 34.567 [=]	1234°56'47."
3h45m –	3 [D°M'S] 45 [−] 1.69 [=]	
1.69h = [60]	[2ndF] [↔DEG]	2°3'36."
sin62°12'24" = [10]	[sin] 62 [D°M'S] 12 [D°M'S] 24 [=]	0.884635235
24°→["]	24 [D°M'S] [MATH] [2]	86'400.
1500"→[']	0 [D°M'S] 0 [D°M'S] 1500 [MATH] [3]	25.

【13】 [→rθ] [→xy] [,] [←→]

	[ON/C] 6 [2ndF] [,] 4	
$x = 6$, $y = 4$ → $r =$	[2ndF] [→rθ] [r]	7.211102551
θ = [°]	[2ndF] [←→] [θ]	33.69006753
	[2ndF] [←→] [r]	7.211102551
	14 [2ndF] [,] 36	
$r = 14$, θ = 36[°] → $x =$	[2ndF] [→xy] [x]	11.32623792
$y =$	[2ndF] [←→] [y]	8.228993532
	[2ndF] [←→] [x]	11.32623792

【14】 [CNST]

V_0 = 15.3m/s	[ON/C] 15.3 [×] 10 [+] 2 [2ndF] [x^{-1}] [×]	
t = 10s	[CNST] 03 [×] 10 [x^2] [=]	643.3325
$V_0t+\frac{1}{2}gt^2$ = ?m		

【15】 [CONV]

125yd = ?m	[ON/C] 125 [2ndF] [CONV] 5 [=]	114.3

【16】 [MATH] (k, M, G, T, m, µ, n, p, f)

100m×10k=	100 [MATH] [1] [4] [×]	
	10 [MATH] [1] [0] [=]	1'000.

【17】 [MDF] [SET UP]

5÷9=ANS	[ON/C] [SET UP] [1] [0] [SET UP] [2] 1	
ANS×9=	5 [÷] 9 [=]	0.6
[FIX,TAB=1]	[×] 9 [=]*1	5.0
	5 [÷] 9 [=] [2ndF] [MDF]	0.6
	[×] 9 [=]*2	5.4
	[SET UP] [1] [3]	

*1 5.5555555555555×10⁻¹×9

*2 0.6×9

【18】 [MATH] (SOLV)

sin x–0.5	[ON/C] [sin] [ALPHA] [x] [−] 0.5	
Start= 0	[MATH] [0] 0 [ENT] [ENT]	30.
Start= 180	[ENT] 180 [ENT] [ENT]	150.

【19】 [ALGB]

	[MODE] [0]	
$f(x) = x^3–3x^2+2$	[ALPHA] [x] [y^x] 3 [−] 3 [ALPHA]	
	[x] [x^2] [+] 2 [2ndF] [ALGB]	
x = –1	1 [+/−] [ENT]	–2.
x = –0.5	[2ndF] [ALGB] 0.5 [+/−] [ENT]	1.125
$\sqrt{A^2+B^2}$	[2ndF] [√] [(] [ALPHA] [A] [x^2] [+]	
	[ALPHA] [B] [x^2] [)] [2ndF] [ALGB]	
A = 2, B = 3	2 [ENT] 3 [ENT]	3.605551275
A = 2, B = 5	[2ndF] [ALGB] [ENT] 5 [ENT]	5.385164807

【20】 [DATA] [(x,y)] [$\bar{x}$] [sx] [σx] [n] [Σx] [$Σx^2$] [$\bar{y}$] [sy] [σy] [Σy] [$Σy^2$] [Σxy] [r] [a] [b] [c] [x'] [y'] [←→] [MATH] (→t, P(, Q(, R()

DATA		
95	[MODE] [1] [0]	0.
80	95 [DATA]	1.
80	80 [DATA]	2.
75	[DATA]	3.
75	75 [(x,y)] 3 [DATA]	4.
75	50 [DATA]	5.
50		
$\bar{x}$=	[RCL] [$\bar{x}$]	75.71428571
σx=	[RCL] [σx]	12.37179148
n=	[RCL] [n]	7.
Σx=	[RCL] [Σx]	530.
Σx^2=	[RCL] [$Σx^2$]	41'200.
sx=	[RCL] [sx]	13.3630621
sx^2=	[x^2] [=]	178.5714286
$\frac{(95-\bar{x})}{sx}$×10+50=	[(] 95 [−] [ALPHA] [$\bar{x}$] [)]	
	[÷] [ALPHA] [sx] [×] 10	
	[+] 50 [=]	64.43210706
x = 60 → P(t) ?	[MATH] [1] 60 [MATH] [0] [)] [=]	0.102012
t = –0.5 → R(t) ?	[MATH] [3] 0.5 [+/−] [)] [=]	0.691463

x	y		
		[MODE] [1] [1]	0.
2	5	2 [(x,y)] 5 [DATA]	1.
2	5	[DATA]	2.
12	24	12 [(x,y)] 24 [DATA]	3.
21	40	21 [(x,y)] 40 [(x,y)] 3 [DATA]	4.
21	40	15 [(x,y)] 25 [DATA]	5.
21	40	[RCL] [a]	1.050261097
15	25	[RCL] [b]	1.826044386
		[RCL] [r]	0.995176343
		[RCL] [sx]	8.541216597
		[RCL] [sy]	15.67223812

x=3 → y'=?	3 [2ndF] [y']	6.528394256
y=46 → x'=?	46 [2ndF] [x']	24.61590706

x	y		
		[MODE] [1] [2]	0.
12	41	12 [(x,y)] 41 [DATA]	1.
8	13	8 [(x,y)] 13 [DATA]	2.
5	2	5 [(x,y)] 2 [DATA]	3.
23	200	23 [(x,y)] 200 [DATA]	4.
15	71	15 [(x,y)] 71 [DATA]	5.
		[RCL] [a]	5.357506761
		[RCL] [b]	–3.120289663
		[RCL] [c]	0.503334057

x=10 → y'=?	10 [2ndF] [y']	24.4880159
y=22 → x'=?	22 [2ndF] [x']	9.63201409
	[2ndF] [←→]	–3.432772026
	[2ndF] [←→]	9.63201409

【21】 [DATA] [▲] [▼]

DATA		
30	[MODE] [1] [0]	0.
40	30 [DATA]	1.
40	40 [(x,y)] 2 [DATA]	2.
50	50 [DATA]	3.

↓

DATA		
30	[▼] [▼] [▼]	
45	45 [(x,y)] 3 [DATA]	X2= 45.
45	[▼]	N2= 3.
45		
60	[▼] 60 [DATA]	X3= 60.

【22】

$$\bar{x} = \frac{\Sigma x}{n} \qquad \sigma x = \sqrt{\frac{\Sigma x^2 - n\bar{x}^2}{n}}$$

$$sx = \sqrt{\frac{\Sigma x^2 - n\bar{x}^2}{n-1}} \qquad \Sigma x = x_1 + x_2 + \cdots + x_n$$

$$\Sigma x^2 = x_1^2 + x_2^2 + \cdots + x_n^2$$

$$\bar{y} = \frac{\Sigma y}{n} \qquad \sigma y = \sqrt{\frac{\Sigma y^2 - n\bar{y}^2}{n}}$$

$$sy = \sqrt{\frac{\Sigma y^2 - n\bar{y}^2}{n-1}} \qquad \Sigma xy = x_1y_1 + x_2y_2 + \cdots + x_ny_n$$

$$\Sigma y = y_1 + y_2 + \cdots + y_n$$

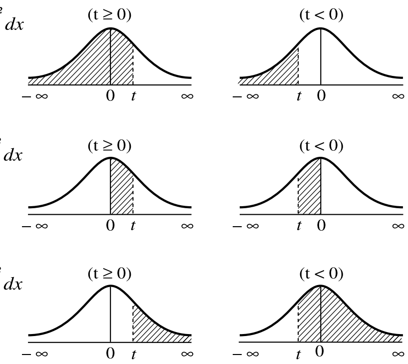
$$\Sigma y^2 = y_1^2 + y_2^2 + \cdots + y_n^2$$

【23】

$$P(t) = \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{t} e^{-\frac{x^2}{2}}\,dx$$

$$Q(t) = \frac{1}{\sqrt{2\pi}}\int_{0}^{t} e^{-\frac{x^2}{2}}\,dx$$

$$R(t) = \frac{1}{\sqrt{2\pi}}\int_{t}^{\infty} e^{-\frac{x^2}{2}}\,dx$$



$t = \frac{x - \bar{x}}{\sigma x}$

Standardization conversion formula
Standard Umrechnungsformel
Formule de conversion de standardisation
Fórmula de conversión de estandarización
Fórmula de conversão padronizada
Formula di conversione della standardizzazione
Standaardisering omzettingsformule
Standard átváltási képlet
Vzorec pro přepočet rozdělení
Omvandlingsformel för standardisering
Normituksen konversiokaava
Формула стандартизованного преобразования
Omregningsformel for standardisering
สูตรแปลงคามาตรฐาน
صيغة التحويل لتوحيد المقاييس
标准化的转换公式
Rumus penukaran pemiawaian
Rumus konversi standarisasi

【24】 [MODE] (2-VLE)

$$\begin{cases} a_1x + b_1y = c_1 \\ a_2x + b_2y = c_2 \end{cases} \qquad |D| = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}$$

	[MODE] [2] [0]	
$2x + 3y = 4$	2 [ENT] 3 [ENT] 4 [ENT]	
$5x + 6y = 7$	5 [ENT] 6 [ENT] 7	
x = ?	[ENT] [x]	*–1.*
y = ?	[ENT] [y]	*2.*
det(D) = ?	[ENT] [det(D)]	*–3.*

【25】 [MODE] (3-VLE)

$$\begin{cases} a_1x + b_1y + c_1z = d_1 \\ a_2x + b_2y + c_2z = d_2 \\ a_3x + b_3y + c_3z = d_3 \end{cases} \qquad |D| = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$$

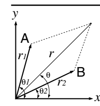
	[MODE] [2] [1]	
$x + y - z = 9$	1 [ENT] 1 [ENT] 1 [+/–] [ENT] 9 [ENT]	
$6x + 6y - z = 17$	6 [ENT] 6 [ENT] 1 [+/–] [ENT] 17 [ENT]	
$14x - 7y + 2z = 42$	14 [ENT] 7 [+/–] [ENT] 2 [ENT] 42	
x = ?	[ENT] [x]	*3.238095238*
y = ?	[ENT] [y]	*–1.638095238*
z = ?	[ENT] [z]	*–7.4*
det(D) = ?	[ENT] [det(D)]	*105.*

【26】 [MODE] (QUAD, CUBIC)

	[MODE] [2] [2]	
$3x^2 + 4x - 95 = 0$	3 [ENT] 4 [ENT] [+/–] 95	
$x1$ = ?	[ENT]	*5.*
$x2$ = ?	[ENT]	*–6.333333333*
	[2ndF] [ENT]	*5.*

	[MODE] [2] [3]	
$5x^3 + 4x^2 + 3x + 7 = 0$	5 [ENT] 4 [ENT] 3 [ENT] 7	
$x1$ = ?	[ENT]	*–1.233600307*
$x2$ = ?	[ENT]	*0.216800153*
	[2ndF] [←,→]	+ *1.043018296* i
$x3$ = ?	[ENT]	*0.216800153*
	[2ndF] [←,→]	– *1.043018296* i

【27】 [MODE] (CPLX)

	[MODE] [3]	
(12–6i) + (7+15i) –	12 [–] 6 [i] [+] 7 [+] 15 [i] [–]	
(11+4i) =	[(] 11 [+] 4 [i] [)] [=] [x]	*8.*
	[2ndF] [←,→] [y]	+ *5.* i
	[2ndF] [←,→] [x]	*8.*
6×(7–9i) ×	6 [×] [(] 7 [–] 9 [i] [)] [×]	
(–5+8i) =	[(] 5 [+/–] [+] 8 [i] [)] [=] [x]	*222.*
	[2ndF] [←,→] [y]	+ *606.* i
16×(sin30°+	16 [×] [(] [sin] 30 [+]	
$i$cos30°)÷(sin60°+	[i] [cos] 30 [)] [÷] [(] [sin] 60 [+]	
$i$cos60°)=	[i] [cos] 60 [)] [=] [x]	*13.85640646*
	[2ndF] [←,→] [y]	+ *8.* i
	[2ndF] [→$r\theta$] 8 [∠] 70 [+] 12 [∠] 25	
$r1$ = 8, θ1 = 70°	[=] [r]	*18.5408873*
$r2$ = 12, θ2 = 25°	[2ndF] [←,→] [θ]	∠ *42.76427608*
↓		
r = ?, θ = ?°		
(1 + i)	[2ndF] [→xy] 1 [+] [i] [=]	*1.*
↓	[2ndF] [→$r\theta$] [r]	*1.414213562*
r = ?, θ = ?°	[2ndF] [←,→] [θ]	∠ *45.*
	[2ndF] [→xy] [(] 2 [–] 3 [i] [)] [x^2]	
$(2 - 3i)^2$ =	[=] [x]	*–5.*
	[2ndF] [←,→] [y]	– *12.* i
$\frac{1}{1+i}$ =	[(] 1 [+] [i] [)] [2ndF] [x^{-1}] [=] [x]	*0.5*
	[2ndF] [←,→] [y]	– *0.5* i
CONJ(5+2i)	[MATH] [0] [(] 5 [+] 2 [i] [)] [=] [x]	*5.*
	[2ndF] [←,→] [y]	– *2.* i

【28】

Function Funktion Fonction Función Função Funzioni Functie Függvény Funkce Funktion Funktio Функция Funktion ฟังก์ชัน الدالة 函数 Fungsi Fungsi	Dynamic range zulässiger Bereich Plage dynamique Rango dinámico Gama dinâmica Campi dinamici Rekencapaciteit Megengedett számítási tartomány Dynamický rozsah Definitionsområde Dynaaminen ala Динамический диапазон Dynamikområde พิสัยในการคำนวณ النطاق الديناميكي 取值范围 Julat dinamik Kisaran dinamis
sin x, cos x, tan x	DEG: $\lvert x \rvert < 10^{10}$ (tan x : $\lvert x \rvert \neq 90\,(2n-1)$)* RAD: $\lvert x \rvert < \frac{\pi}{180} \times 10^{10}$ (tan x : $\lvert x \rvert \neq \frac{\pi}{2}\,(2n-1)$)* GRAD: $\lvert x \rvert < \frac{10}{9} \times 10^{10}$ (tan x : $\lvert x \rvert \neq 100\,(2n-1)$)*
$\sin^{-1}x$, $\cos^{-1}x$	$\lvert x \rvert \leq 1$
$\tan^{-1}x$, $\sqrt[3]{x}$	$\lvert x \rvert < 10^{100}$
ln x, log x	$10^{-99} \leq x < 10^{100}$
y^x	• $y > 0$: $-10^{100} < x \log y < 100$ • $y = 0$: $0 < x < 10^{100}$ • $y < 0$: $x = n$ $(0 < \lvert x \rvert < 1: \frac{1}{x} = 2n-1,\ x \neq 0)$*, $-10^{100} < x \log \lvert y \rvert < 100$
$\sqrt[x]{y}$	• $y > 0$: $-10^{100} < \frac{1}{x} \log y < 100\ (x \neq 0)$ • $y = 0$: $0 < x < 10^{100}$ • $y < 0$: $x = 2n-1$ $(0 < \lvert x \rvert < 1 : \frac{1}{x} = n,\ x \neq 0)$*, $-10^{100} < \frac{1}{x} \log \lvert y \rvert < 100$
e^x	$-10^{100} < x \leq 230.2585092$
10^x	$-10^{100} < x < 100$
sinh x, cosh x, tanh x	$\lvert x \rvert \leq 230.2585092$
$\sinh^{-1} x$	$\lvert x \rvert < 10^{50}$
$\cosh^{-1} x$	$1 \leq x < 10^{50}$
$\tanh^{-1} x$	$\lvert x \rvert < 1$
x^2	$\lvert x \rvert < 10^{50}$
x^3	$\lvert x \rvert < 2.15443469 \times 10^{33}$
$\sqrt{x}$	$0 \leq x < 10^{100}$
x^{-1}	$\lvert x \rvert < 10^{100}\ (x \neq 0)$
n!	$0 \leq n \leq 69$*
nPr	$0 \leq r \leq n \leq 9999999999$* $\frac{n!}{(n-r)!} < 10^{100}$
nCr	$0 \leq r \leq n \leq 9999999999$* $0 \leq r \leq 69$ $\frac{n!}{(n-r)!} < 10^{100}$
↔DEG, D°M'S	0°0'0.00001" ≤ $\lvert x \rvert$ < 10000°
$x, y \rightarrow r, \theta$	$\sqrt{x^2 + y^2} < 10^{100}$
$r, \theta \rightarrow x, y$	$0 \leq r < 10^{100}$ DEG: $\lvert \theta \rvert < 10^{10}$ RAD: $\lvert \theta \rvert < \frac{\pi}{180} \times 10^{10}$ GRAD : $\lvert \theta \rvert < \frac{10}{9} \times 10^{10}$
DRG ▶	DEG→RAD, GRAD→DEG: $\lvert x \rvert < 10^{100}$ RAD→GRAD: $\lvert x \rvert < \frac{\pi}{2} \times 10^{98}$
(A+Bi)+(C+Di)	$\lvert A + C \rvert < 10^{100}$, $\lvert B + D \rvert < 10^{100}$
(A+Bi)–(C+Di)	$\lvert A - C \rvert < 10^{100}$, $\lvert B - D \rvert < 10^{100}$
(A+Bi)×(C+Di)	$(AC - BD) < 10^{100}$ $(AD + BC) < 10^{100}$
(A+Bi)÷(C+Di)	$\frac{AC + BD}{C^2 + D^2} < 10^{100}$ $\frac{BC - AD}{C^2 + D^2} < 10^{100}$ $C^2 + D^2 \neq 0$
→DEC →BIN →PEN →OCT →HEX AND OR XOR XNOR	DEC : $\lvert x \rvert \leq 9999999999$ BIN : $1000000000 \leq x \leq 1111111111$ $0 \leq x \leq 111111111$ PEN : $2222222223 \leq x \leq 4444444444$ $0 \leq x \leq 2222222222$ OCT : $4000000000 \leq x \leq 7777777777$ $0 \leq x \leq 3777777777$ HEX : FDABF41C01 ≤ x ≤ FFFFFFFFFF 0 ≤ x ≤ 2540BE3FF
NOT	BIN : $1000000000 \leq x \leq 1111111111$ $0 \leq x \leq 111111111$ PEN : $2222222223 \leq x \leq 4444444444$ $0 \leq x \leq 2222222221$ OCT : $4000000000 \leq x \leq 7777777777$ $0 \leq x \leq 3777777777$ HEX : FDABF41C01 ≤ x ≤ FFFFFFFFFF 0 ≤ x ≤ 2540BE3FE
NEG	BIN : $1000000001 \leq x \leq 1111111111$ $0 \leq x \leq 111111111$ PEN : $2222222223 \leq x \leq 4444444444$ $0 \leq x \leq 2222222222$ OCT : $4000000001 \leq x \leq 7777777777$ $0 \leq x \leq 3777777777$ HEX : FDABF41C01 ≤ x ≤ FFFFFFFFFF 0 ≤ x ≤ 2540BE3FF

* n, r: integer / ganze Zahlen / entier / entero / inteiro / intero / geheel getal / egész számok / celé číslo / heltal / kokonaisluku / целые / heltal / จำนวนเต็ม / عدد صحيح / 整数 / integer / bilangan bulat

In Europe:

This equipment complies with the requirements of Directive 89/336/EEC as amended by 93/68/EEC.

Dieses Gerät entspricht den Anforderungen der EG-Richtlinie 89/336/EWG mit Änderung 93/68/EWG.

Ce matériel répond aux exigences contenues dans la directive 89/336/CEE modifiée par la directive 93/68/CEE.

Dit apparaat voldoet aan de eisen van de richtlijn 89/336/EEG, gewijzigd door 93/68/EEG.

Dette udstyr overholder kravene i direktiv nr. 89/336/EEC med tillæg nr. 93/68/EEC.

Quest' apparecchio è conforme ai requisiti della direttiva 89/336/EEC come emendata dalla direttiva 93/68/EEC.

Η εγκατάσταση αυτή ανταποκρίνεται στις απαιτήσεις των οδηγιών της Ευρωπαϊκής Ενωσης 89/336/ΕΟΚ, όπως ο κανονισμός αυτός συμπληρώθηκε από την οδηγία 93/68/ΕΟΚ.

Este equipamento obedece às exigências da directiva 89/336/CEE na sua versão corrigida pela directiva 93/68/CEE.

Este aparato satisface las exigencias de la Directiva 89/336/CEE modificada por medio de la 93/68/CEE.

Denna utrustning uppfyller kraven enligt riktlinjen 89/336/EEC så som kompletteras av 93/68/EEC.

Dette produktet oppfyller betingelsene i direktivet 89/336/EEC i endringen 93/68/EEC.

Tämä laite täyttää direktiivin 89/336/EEC vaatimukset, jota on muutettu direktiivillä 93/68/EEC.

Данное устройство соответствует требованиям директивы 89/336/EEC с учетом поправок 93/68/EEC.

Ez a készülék megfelel a 89/336/EGK sz. EK-irányelvben és annak 93/68/EGK sz. módosításában foglalt követelményeknek.

Tento přístroj vyhovuje požadavkům směrnice 89/336/EEC v platném znění 93/68/EEC.

Nur für Deutschland/For Germany only:

Umweltschutz
Das Gerät wird durch eine Batterie mit Strom versorgt.
Um die Batterie sicher und umweltschonend zu entsorgen, beachten Sie bitte folgende Punkte:

- Bringen Sie die leere Batterie zu Ihrer örtlichen Mülldeponie, zum Händler oder zum Kundenservice-Zentrum zur Wiederverwertung.
- Werfen Sie die leere Batterie niemals ins Feuer, ins Wasser oder in den Hausmüll.

Seulement pour la France/For France only:

Protection de l'environnement
L'appareil est alimenté par pile. Afin de protéger l'environnement, nous vous recommandons:

- d'apporter la pile usagée ou à votre revendeur ou au service après-vente, pour recyclage.
- de ne pas jeter la pile usagée dans une source de chaleur, dans l'eau ou dans un vide-ordures.

Endast svensk version/For Sweden only:

Miljöskydd
Denna produkt drivs av batteri.
Vid batteribyte skall följande iakttagas:

- Det förbrukade batteriet skall inlämnas till er lokala handlare eller till kommunal miljöstation för återinssamling.
- Kasta ej batteriet i vattnet eller i hushållssoporna. Batteriet får ej heller utsättas för öppen eld.

OPMERKING: ALLEEN VOOR NEDERLAND/
NOTE: FOR NETHERLANDS ONLY

NL Batterij niet weggooien, maar inleveren als KCA.

- Physical Constants and Metric Conversions are shown in the tables.
- Physikalischen Konstanten und metriche Umrechnungen sind in der Tabelle aufgelistet.
- Les constants physiques et les conversion des unités sont indiquées sur les tableaux.
- Las constants fisicas y conversiones métricas son mostradas en las tables.
- Constantes Fisicas e Conversões Métricas estão mostradas nas tablelas.
- La constanti fisiche e le conversioni delle unità di misura vengono mostrate nella tabella.
- De natuurconstanten en metrische omrekeningen staan in de tabellen hiernaast.
- A fizikai konstansok és a metrikus átváltások a táblázatokban találhatók.
- Fyzikální konstanty a převody do metrické soustavy jsou uvedeny v tabulce.
- Fysikaliska konstanter och metriska omvandlingar visas i tabellerna.
- Fysikaaliset vakiot ja metrimuunnokset näkyvät taulukoista.
- В таблицах показаны физические константы и метрические преобразования.
- Fysiske konstanter og metriske omskrivninger vises i tabellen.
- ค่าคงที่ทางฟิสิกส์และการแปลงหน่วยเมตริกแสดงไว้ในตาราง
- الثوابت الفيزيائية والجداول المترية مبيّنة في الجداول.
- 关于物理常数和公制转换的问题请参见表中所示内容。
- Pemalar Fizik dan Pertukaran Metrik ditunjukkan di dalam jadual.
- Konstanta Fisika dan Konversi Metrik diperlihatkan di dalam tabel.

PHYSICAL CONSTANTS (CNST) 01 — 52

No. SYMBOL	UNIT	No. SYMBOL	UNIT	No. SYMBOL	UNIT
01 - c, c_0	m s^{-1}	19 - μ_B	J T^{-1}	37 - eV	J
02 - G	m^3 kg^{-1} s^{-2}	20 - μ_e	J T^{-1}	38 - t	K
03 - g_n	m s^{-2}	21 - μ_N	J T^{-1}	39 - AU	m
04 - m_e	kg	22 - μ_p	J T^{-1}	40 - pc	m
05 - m_p	kg	23 - μ_n	J T^{-1}	41 - $M(^{12}C)$	kg mol^{-1}
06 - m_n	kg	24 - μ_μ	J T^{-1}	42 - $\hbar$	J s
07 - m_μ	kg	25 - λ_c	m	43 - E_h	J
08 - lu	kg	26 - $\lambda_{c,p}$	m	44 - G_0	s
09 - e	C	27 - σ	W m^{-2} K^{-4}	45 - α^{-1}	
10 - h	J s	28 - N_A, L	mol^{-1}	46 - m_p/m_e	
11 - k	J K^{-1}	29 - V_m	m^3 mol^{-1}	47 - M_u	kg mol^{-1}
12 - μ_0	N A^{-2}	30 - R	J mol^{-1} K^{-1}	48 - $\lambda_{c,n}$	m
13 - ε_0	F m^{-1}	31 - F	C mol^{-1}	49 - c_1	W m^2
14 - r_e	m	32 - R_K	Ohm	50 - c_2	m K
15 - α		33 - $-e/m_e$	C kg^{-1}	51 - Z_0	Ω
16 - a_0	m	34 - $h/2m_e$	m^2 s^{-1}	52 -	Pa
17 - R_∞	m^{-1}	35 - γ_p	s^{-1} T^{-1}		
18 - Φ_0	Wb	36 - K_J	Hz V^{-1}		

METRIC CONVERSIONS x (2ndF) (CONV) 1 — 44

No.	UNIT	No.	UNIT	No.	UNIT
1	in→cm	16	kg→lb	31	J→cal$_{IT}$
2	cm→in	17	°F→°C	32	cal$_{IT}$→J
3	ft→m	18	°C→°F	33	hp→W
4	m→ft	19	gal (US)→ℓ	34	W→hp
5	yd→m	20	ℓ→gal (US)	35	ps→W
6	m→yd	21	gal (UK)→ℓ	36	W→ps
7	mile→km	22	ℓ→gal (UK)	37	kgf/cm^2→Pa
8	km→mile	23	fl oz (US)→mℓ	38	Pa→kgf/cm^2
9	n mile→m	24	mℓ→fl oz (US)	39	atm→Pa
10	m→n mile	25	fl oz (UK)→mℓ	40	Pa→atm
11	acre→m^2	26	mℓ→fl oz (UK)	41	mmHg→Pa
12	m^2→acre	27	J→cal	42	Pa→mmHg
13	oz→g	28	cal→J	43	kgf·m→J
14	g→oz	29	J→cal$_{15}$	44	J→kgf·m
15	lb→kg	30	cal$_{15}$→J		